In the claims:

1. (Previously presented) A method for laser processing a silicon, gallium arsenide, indium phosphide, or single crystalline sapphire substrate, comprising:

providing slow and fast movement-controlling signals from a positioning signal processor;

controlling with a slow positioner driver a large range of relative movement of a translation stage in response to the slow movement-controlling signal;

controlling with a fast positioner driver a small range of relative movement of a fast positioner in response to the fast movement-controlling signal;

generating first laser system output having at least a first laser pulse at a wavelength shorter than 400 nm and having an output pulse energy of greater than 100 μJ at a repetition rate of greater than 5 kHz;

directing the first laser system output at a target location on the substrate to ablate substrate material at the target location with a first spot area of less than 25 μm on the surface of the target material;

generating second laser system output having at least a second laser pulse at a wavelength shorter than 400 nm and having an output pulse energy of greater than 100 μJ at a repetition rate of greater than 5 kHz;

directing the second laser output to impinge a second target location with a second spot area of less than 25 μm on the surface of the target material such that the second spot area at least partly overlaps the first spot area.

2. (Previously presented) A method for laser processing a silicon, gallium arsenide, indium phosphide, or single crystalline sapphire substrate, comprising:

generating first laser system output at a wavelength shorter than 400 nm and having an output pulse energy of greater than 100 μJ at a repetition rate of greater than 5 kHz;

directing the first laser system output at a target location on the substrate to ablate substrate material at the target location with a first spot area of less than 25 μm on the surface of the target material;

generating second laser system output at a wavelength shorter than 400 nm and having an output pulse energy of greater than 100 μJ at a repetition rate of greater than 5 kHz;

directing the second laser output to impinge a second target location with a second spot area of less than 25 μm on the surface of the target material such that the second spot area at least partly overlaps the first spot area to form a through hole through the substrate, substrate being at least 50 μm thick and the through hole having an aspect ratio of greater than about 20:1.

3. (Previously presented) The method of claim 2 in which at least 5 laser system output pulses are generated at a repetition rate of greater than 5 kHz.

4. (Original) The method of claim 2 in which the substrate is impinged on its front surface and the through hole penetrates its back surface, the method further comprising:

employing characteristics of the through hole on the back surface for aligning a device to perform a process on the back surface of the substrate.

5. (Original) The method of claim 4 in which at least two through holes are formed and both through holes are employed to align the back surface of the substrate for further processing.

6. (Previously presented) The method of claim 2 in which the substrate is impinged on its front surface and the through hole penetrates its back surface, and in which the substrate is supported by a chuck having a surface material that is substantially nonreflective to the laser system outputs that travel through the through hole.

7. (Original) The method of claim 6 in which the surface material of the chuck substantially inhibits laser damage to the back surface of substrate.

8. (Original) The method of claim 6 in which the surface material of the chuck is substantially transparent to the laser system outputs.

9. (Original) The method of claim 6 in which the surface material of the chuck is substantially absorbing to the wavelength of the laser system outputs.

10. (Original) The method of claim 2 in which the substrate is impinged on its front surface and the through hole penetrates its back surface, and in which the substrate is supported by a chuck having a surface material has openings over which through hole processing occurs.

11. (Previously presented) A method for laser processing a silicon, gallium arsenide, indium phosphide, or single crystalline sapphire substrate, comprising:

generating first laser system output at a wavelength shorter than 400 nm and having an output pulse energy of greater than 100 μJ at a repetition rate of greater than 5 kHz;

directing the first laser system output at a target location on the substrate to ablate substrate material at the target location with a first spot area of less than 25 μm on the surface of the target material;

generating second laser system output at a wavelength shorter than 400 nm and having an output pulse energy of greater than 100 μJ at a repetition rate of greater than 5 kHz;

directing the second laser output to impinge a second target location with a second spot area of less than 25 μm on the surface of the target material such that the second spot area at least partly overlaps the first spot area to form a kerf having a lengthwise dimension greater than the spot size.

12. (Original) The method of claim 11 in which characteristics of the laser outputs inhibit formation of a melt lip.

13. (Original) The method of claim 11 in which characteristics of the laser outputs inhibit slag formation.

14. (Original) The method of claim 11 in which characteristics of the laser outputs inhibit peel back of the kerf edge.

15. (Previously presented) The method of claim 11 further comprising:

generating successive laser system outputs at a wavelength shorter than 400 nm and having output pulse energies of greater than 100 μJ at a repetition rate of greater than 5 kHz;

directing the successive laser outputs to impinge successive target locations with spot areas of less than 25 μm on the surface of the target material such that the successive spot areas at least partly overlap respective preceding spot areas to form the kerf.

16. (Original) The method of claim 11 in which the kerf comprises a curvilinear profile.

17. (Original) The method of claim 11 further comprising:

providing slow and fast movement-controlling signals from a positioning signal processor;

controlling with a slow positioner driver a large range of relative movement of a translation stage in response to the slow movement-controlling signal;

controlling with a fast positioner driver a small range of relative movement of a fast positioner in response to the fast movement-controlling signal to effect the curvilinear profile of the kerf.

18. (Original) The method of claim 11 in which the substrate has deep kerfs with bottoms, and the deep kerfs separate devices but retain sufficient thickness of substrate at the bottom of the deep kerfs to connect the devices, further comprising employing the laser system outputs to separate the devices.

19. (Previously presented) The method of claim 11 in which the substrate has a substrate depth and the kerf extends through the substrate depth, and in which the substrate is supported by a chuck having a surface material that is substantially nonreflective to the laser system outputs that travel through the kerf.

20. (Original) The method of claim 19 in which the surface material of the chuck substantially inhibits laser damage to the back surface of substrate.

21. (Original) The method of claim 19 in which the surface material of the chuck is substantially transparent to the laser system outputs.

22. (Original) The method of claim 19 in which the surface material of the chuck is substantially absorbing to the wavelength of the laser system outputs.

23. (Original) The method of claim 11 in which the substrate has a substrate depth and the kerf extends through the substrate depth, and in which the chuck has openings over which through kerf processing occurs.

24.-30. (Canceled)

31. (Previously presented) A method for laser processing a silicon, gallium arsenide, indium phosphide, or single crystalline sapphire substrate of a workpiece having first and second surfaces, comprising:

providing slow and fast movement-controlling signals from a positioning signal processor;

controlling with a slow positioner driver a large range of relative movement of a translation stage in response to the slow movement-controlling signal, the translation stage comprising or supporting a chuck having a surface material that is substantially nonreflective to laser system outputs;

controlling with a fast positioner driver a small range of relative movement of a fast positioner in response to the fast movement-controlling signal;

generating successive laser system outputs at a wavelength shorter than 400 nm and having output pulse energies of greater than 100 μJ at a repetition rate of greater than 5 kHz;

directing the successive laser outputs to impinge successive target locations with spot areas of less than 25 μm on a first surface of the workpiece such that the successive spot areas at least partly overlap respective preceding spot areas to form a through hole or through cut in the substrate without substantially damaging the second surface.

32. (Previously presented) The method of claim 31 in which the surface material of the chuck is substantially transparent to the laser system outputs that travel through the through cut or through hole.

33. (Previously presented) The method of claim 31 in which the surface material of the chuck is substantially absorbing to the wavelength of the laser system outputs that travel through the through cut or through hole.

34.-37. (Canceled)

38. (Previously presented) The method of claim 1 in which characteristics of the laser outputs inhibit formation of a melt lip.

39. (Previously presented) The method of claim 1 in which characteristics of the laser outputs inhibit slag formation.

40. (Previously presented) The method of claim 1 further comprising:

generating successive laser system outputs at a wavelength shorter than 400 nm and having output pulse energies of greater than 100 μJ at a repetition rate of greater than 5 kHz;

directing the successive laser outputs to impinge successive target locations with spot areas of less than 25 μm on the surface of the target material such that the successive spot areas at least partly overlap respective preceding spot areas to form the kerf.

41. (Previously presented) The method of claim 40 in which the kerf comprises a curvilinear profile.

42. (Previously presented) The method of claim 40 in which characteristics of the laser outputs inhibit peel back of the kerf edge.

43. (Previously presented) The method of claim 1 in which the first and second laser system outputs are generated by the same laser, which is a solid-state laser.

44. (Previously presented) The method of claim 2 in which the first and second laser system outputs are generated by the same laser.

45. (Previously presented) The method of claim 11 in which the first and second laser system outputs are generated by the same laser.

46. (Canceled)

47. (Previously presented) The method of claim 31 in which the successive laser system outputs are generated by the same laser.

48. (Previously presented) The method of claim 1 in which the first and second laser system outputs are generated by at least two lasers.

49. (Previously presented) The method of claim 2 in which the first and second laser system outputs are generated by at least two lasers.

50. (Previously presented) The method of claim 11 in which the first and second laser system outputs are generated by at least two lasers.

51. (Canceled)

52. (Previously presented) The method of claim 31 in which the successive laser system outputs are generated by at least two lasers.

53. (Previously presented) The method of claim 1 in which the first and second laser system outputs provide a bite size of 0.1 to 10 μm.

55. (Previously presented) The method of claim 11 in which the first and second laser system outputs provide a bite size of 0.1 to 10 μm.

56. (Canceled)

57. (Previously presented) The method of claim 31 in which the successive laser system outputs provide a bite size of 0.1 to 10 μm.

58. (Previously presented) The method of claim 1 in which the first and second laser system outputs have output pulse energies of less than 1500 μJ.

59. (Previously presented) The method of claim 2 in which the first and second laser system outputs have output pulse energies of less than 1500 μJ.

60. (Previously presented) The method of claim 11 in which the first and second laser system outputs have output pulse energies of less than 1500 μJ.

61. (Canceled)

62. (Previously presented) The method of claim 31 in which the successive laser system outputs have output pulse energies of less than 1500 μJ.

63. (Previously presented) The method of claim 1 in which the first and second laser system outputs have output pulse energies of greater than 200 μJ.

64. (Previously presented) The method of claim 2 in which the first and second laser system outputs have output pulse energies of greater than 200 μJ.

65. (Previously presented) The method of claim 11 in which the first and second laser system outputs have output pulse energies of greater than 200 μJ.

66. (Canceled)

67. (Previously presented) The method of claim 31 in which the successive laser system outputs have output pulse energies of greater than 200 μJ.

68. (Previously presented) The method of claim 6 in which the chuck comprises MgF_2 or CaF_2.

69. (Previously presented) The method of claim 19 in which the chuck comprises MgF_2 or CaF_2.

70. (Canceled)

71. (Previously presented) The method of claim 31 in which the chuck comprises MgF_2 or CaF_2.

72. (Previously presented) The method of claim 2 in which the substrate has a depth of greater than 300 μm.

73. (Previously presented) The method of claim 31 in which the substrate has a depth of greater than 300 μm.

74. (Previously presented) The method of claim 2 in which the substrate has a depth of greater than 500 μm.

75. (Previously presented) The method of claim 31 in which the substrate has a depth of greater than 500 μm.